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# **Recommendations from Plenary Sessions and Working Group Splinter Meetings**



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# Infrastructure Committee

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- See extra slides

## Data Center Working Group

- The DCs recommend to continue the efforts by the Infrastructure Committee and the RINEX WG to agree on new file names.
- Until the RINEX version 3 file-name convention is finalized, separate directories for distinguishing between files created from streams and by receivers will be established by all DCs.
- All DCs explore transition options for follow on compression scheme to replace UNIX “compress” as early as possible.

## Real-Time Working Group

- Identify a core set of stations for use by all RTAC's in the generation of real-time clocks.  
Responsible: RTACC and RTAC's; Timeframe – start process immediately
- Monitor the stability of the core set of stations on a daily basis  
Responsible – TBD – will be discussed further within the pilot project; Timeframe – ASAP with recognition it is needed before launch of the Real-Time Service
- Analysis Centre Coordinator work towards more frequent updates to the IGU product. Ideally the current cycle of six hours would become one hour.  
Responsible – ACC with cooperation from ACs.  
Timeframe – TBD

## **GNSS Working Group (1)**

- Adopt RINEX Format V3.02 (including QZSS) as soon as possible. Responsible: RINEX WG; Time Frame: 3 months?
- Establish an open source software for RTCM-MSM to RINEX V3.0x conversion. Responsible: IGS community; Time Frame: 6 months
- Encourage the setup of further MGEX tracking sites with focus on global distribution and tracking of the complete suite of available signals. Zero-baseline testbeds are very welcome to study receiver dependent calibration biases. Responsible: GNSS WG, IGS community; Time Frame: 6 months

## GNSS Working Group (2)

- Encourage analysis of the collected MGEX data to establish initial orbit and clock test data sets.  
Responsible: GNSS WG, IGS ACs; Time Frame: 6 months
- Immediate efforts to harmonize the MGEX data archives and to provide an up-to-date and complete picture of the data inventory to the user community. Responsible: GNSS WG, MGEX DC, IGS CB; Time Frame: 1 month

## **Bias and Calibration Working Group**

- Recommendations already covered by other working groups.

# Ionosphere Working Group

- RECOM 1 Higher temporal and spatial resolution of IGS combined GIMs - the IAACs (UPC and JPL) agreed on providing their maps in IONEX format, with a resolution of 15 min, 1 degrees and 1 degrees in time, longitude and latitude respectively.
- Starting a new official/operational product – TEC fluctuation changes over North Pole to study the dynamic of oval irregularities (carried out by UWM to be started as official/routine product after performance evaluation period (end of 2012)).
- The new the IAAC from GNSS Research Center (GRC), Wuhan University, China (Hongping Zhang, end of 2012).
- Cooperation with IRI COSPAR group

## Troposphere Working Group

- Establish automated on-going comparisons of IGS final troposphere estimates (FTEs) with results from other techniques/ACs, with the goal of establishing accuracy of IGS FTEs. Timeframe: next IGS workshop

## Antenna Working Group

- NGS robot calibrations are generally accepted for the IGS antenna phase center model. Biases w.r.t. other calibration institutions have to be further investigated.
- Consistent calibration values for multiple GNSS (at least GPS and GLONASS) from a single source are requested for the IGS antenna phase center model. The AWG decides on exceptions (e.g., for antenna types installed at NGA or GSS stations).
- Conventional phase center offset values for the new GNSS are added to igs08.atx.
- GPS satellite antenna phase center variations contained in igs08.atx are extended with estimation results from CODE for nadir angles  $> 14^\circ$ .

## Clock Product Working Group

- Where possible provide UTC(k) bias offsets of IGS stations collocated at timing laboratories, possibly using pending bias format. This will support utilization of UTC(k) in new v2.0 algorithm.
- Provide updated list of timing important stations to support clock densifications
- Provide v2.0 timescale realignment for other GNSS combined products when available and sufficient clocks are included.

## — Space Vehicle Orbit Dynamics Working Group —

- See recommendations of AC and RF working group
- Repro2 standards agreed:
  - All ACs to implement Earth radiation pressure routines
  - All ACs to implement antenna thrust models
  - All ACs to implement new GPS and GLONASS yaw behaviour models (Dillsner and Weiss)

# AC and RF Working Group (1)

Resolve pending reference frame issues

- consider two-step combination planned for repro2
- prepare final IGb08 and update igs08.atx by September
- quantify (if possible) impact of including >24h orbits by Wk 1702

## AC and RF Working Group (2)

Continue testing low-degree geopotential terms, with an aim to adopt a “conventional model” (if available) for repro2

- further testing of low-degree geopotential terms from CSR by other ACs
  1. need longer spans of results & further comparisons
- possible adoption for repro2
  1. if preliminary NGS results confirmed, IGS should consider adopting a conventional model for annual geopotential variations for Repro2
  2. must coordinate with GRACE, SLR, & IERS group
  3. Srinivas Bettadpur working on GRACE fit to degree 15

## AC and RF Working Group (3)

Finalize and implement set of minimum repro2 analysis standards

- all recommended standards available at <http://acc.igs.org/reprocess2.html>
  1. minimum standards settled (in black)
  2. additional proposed standards for each AC to implement as desire (in red)
- in addition: for all analysis centres, implement and test physical models developed by UCL:
  1. SRP/TRR – using grid files for the bus, and modelling thermal gradients across solar panels using solar and earth radiation fluxes
  2. will update for all GPS & GLO satellite types

# IGS TIGA WG

A long wooden pier extends from the foreground into the sea. The pier is made of wooden planks and has white railings with metal handrails. In the distance, there is a small orange structure on the pier. The sea is a calm, greyish-blue color, and the sky is overcast with grey clouds.

IGS Workshop Olsztyn  
Splinter Meeting 26.07.2012



- Aim of TIGA is to geocentrically reference and monitor the **Tide Gauge Zero** vertical motion
- GNSS at tide gauges is **not (!) (necessarily)** in support of the reference frame, IGS network densification, etc.

## Details on a GNSS@TG station

**Station summary**

IGOS-type acronym :	BRE2
Latitude :	48.38049324
Longitude :	-4.49659521
Installed date :	1998-10-31
Decommissioned date :	
Country :	FRANCE
City (Tide Gauge) :	BREST
Station status :	VERT
Distance to Tide Gauge (M) :	293
Dome number :	100340004
IGOS-like station form :	bst_20120531 log (current)

Map view showing station location at Brest, France.

**Data available at SONEL**

2012 2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000 1999 1998 1997

1996 1995

Reload

J	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
F																															
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Number of days of data present: 167  
Number of days of missing data: 199

**Quality plots on RINEX files**

Ratio observed/predicted number of observations | Yearly tracking performance

Plots generated using software developed by the EPN team at ROB

## Survey for GNSS@TG sites

**GPS**

Home > Data > GPS > GPS

**Which GPS stations?**

Number of stations displayed : 618 | List of stations

**Alert**

Station active (340)  
No data for 30 days (87)  
Decommissioned (84)  
No observations in SONEL (Survey) = 99

All GPS data available (RF stations included)

**GLOSS STATIONS** | UPDATE | DEFAULT | CANCEL

**Survey on Continuous GPS and Tide Gauge co-locations (CGPS@TG)**

In order to get a better idea of the status and opportunities on continuous GPS positioning of tide gauges, a survey is carried out periodically within various geoscientific communities. The survey aims to identify the existing permanent GPS stations which are close to tide gauges (up to approximately 10-15 km).

The survey results can be viewed in conjunction with SONEL data holdings on the map (above). Purple symbols correspond to stations for which there are no observations in SONEL yet.

By clicking on the table icon an on-line updated view of the CGPS@TG information that has been supplied to us is displayed. The table can be sorted by clicking on the column items, and a version of the view (table) can be downloaded in a format compatible with applications like excel (.csv).

A ".kml" file provides a Google Earth view of the CGPS@TG geographical distribution. The **cgps@tg.kml** file is consistent with the above mentioned table (updated weekly). Clicking on a station symbol provides ancillary information on the station, and further clicking on the station name provides access to the so-called GPS sitelog (if the GPS data is available). The CGPS@TG ".kml" view might be useful in conjunction with the ".kml" files of satellite radar altimetry ground tracks provided by CLS, or with the ".kml" file of tide gauge records provided by the PSMSL.

In addition to the periodic surveys, information on CGPS@TG co-locations can also be supplied to us any time by filling in this form. Thank you in advance for your collaboration.

**SURVEY FORM**

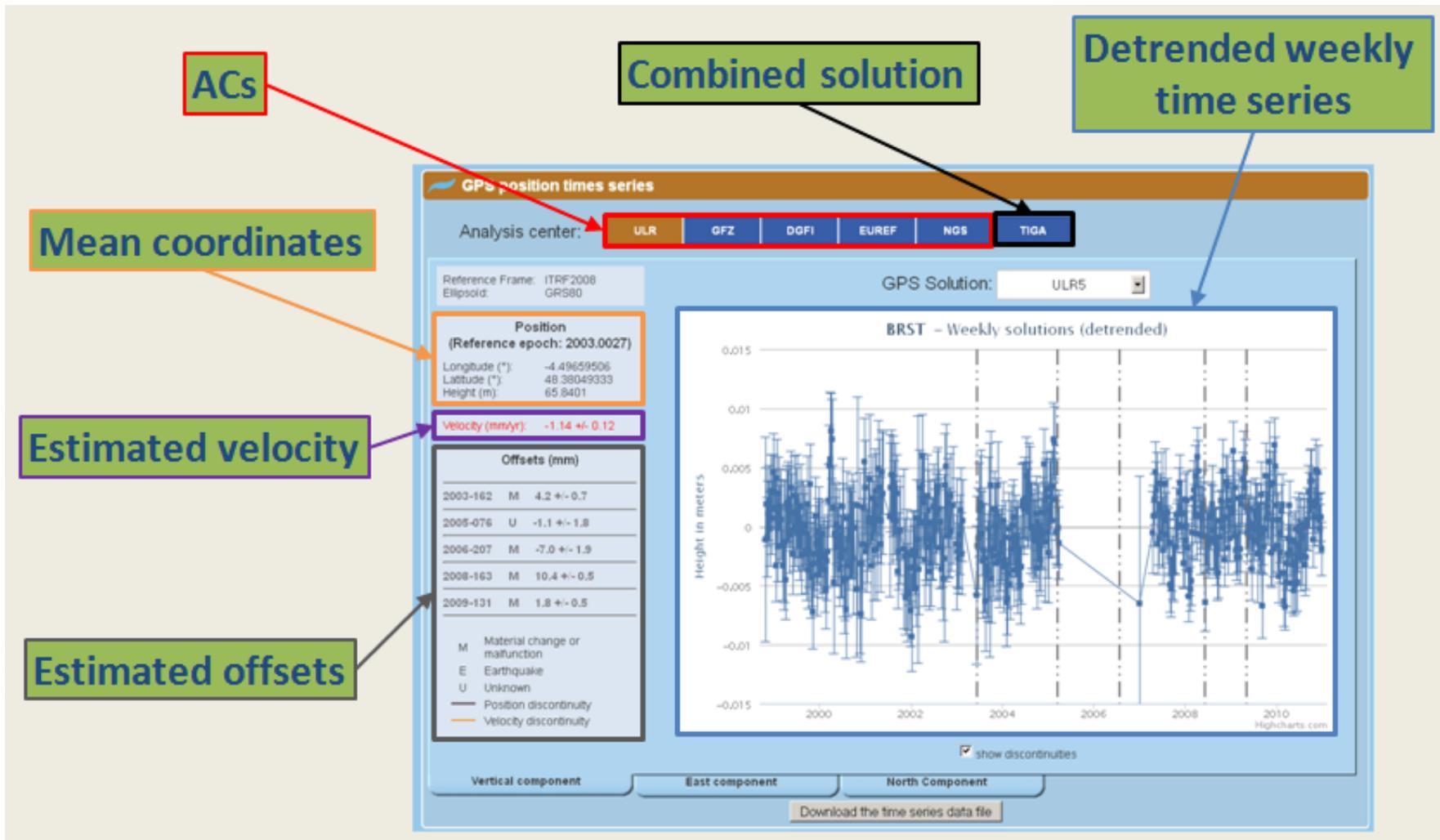
Survey results table

Survey results on kml file

- Three requirements to become a TIGA station:
- Availability of GNSS data & sitelog at the TDCs
  - Tide gauge data being sent to the PSMSL or UHSLC
  - Provision of the TOS (TIGA Observing Station) form

[www.sonel.org](http://www.sonel.org)

# SONEL TIGA DC: Displaying ACs solutions



Example of Brest station: IGS Workshop 2012, Olsztyn, Poland  
<http://www.sonel.org/spip.php?page=gps&idStation=642>

# Recommendations

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- IGS should not forget about coordinates
- REPRO2 should asap
- Non-IGS TIGA stations should be handled with care and marked in the final IGS-repro2 solution
- TIGA repro will follow repro2 as close as possible (3 participating centers)
- Interlink IGS repositories of IGS log files with SONEC for TIGA

# Discussion and Closing Remarks